空氣污染為害農作物徵狀診斷圖鑑

Symptom Diagnosis of Air Pollution Injury to Vegetation.

— A Pictorial Atlas —

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序

自然界所造成的空氣污染長久以來即跟隨著人類的生活環境而相安無事。不過，工業革命之後即帶來了嚴重的社會問題。由於使用煤炭做爲主要的能源，而帶來了二氧化硫的空氣污染，同時成爲人類有史以來第一次的人爲空氣污染，並且造成農作物的經濟損失。從此之後，由於科技的進步，各種不同工業的出現又增加了許多不同的空氣污染物，例如冶金工業及化學工業常常排放某些空氣污染物，諸如二氧化硫、氟化物、氮氧化物及其他空氣污染物等。而在最近數十年來，汽機車排放的廢氣又造成了另一種空氣污染物。排放廢氣中的石油成分在日光照射下與大氣中的某些成分作用，而形成了光化學氧化劑，例如臭氧。以上所提及的空氣污染物的確造成了許多農作物的經濟損失。

空氣污染物爲害農作物常會在植物葉面上顯現典型的或特殊的受害徵狀，這些受害徵狀可以被用來做爲評估空氣污染物爲害農作物的具體證據。以植物葉面受害徵狀來評估空氣污染對溫帶作物的爲害方面，先進國家如美國、日本及歐洲等國都已經有了許多詳細的研究成果，不過，對於亞熱帶作物及熱帶作物至今仍然缺乏研究報告。因此，這本書的主要目的是希望首次將溫帶、亞熱帶及熱帶作物一齊用來做爲偵測空氣污染物的主要憑據。

本書所有的空氣污染爲害農作物徵狀照片，都是台灣省農業試驗所農業化學系農業環境保護研究室過去的研究成果。這些研究工作都是在人工控制環境的薰蒸條件下，於過去這些年來所累積的研究成果。

相信本書內容應該會引起關心空氣品質的科學家、政府官員、工業界人士、環保人士及其他人的廣泛興趣。

Preface

Natural sources of air pollution have been with us for a long time, but they did not achieve the status of a major social problem until the industrial revolution. The introduction of coal as a source of energy polluted the air with sulfur dioxide and became one of the first man-made air pollutants to cause economic damage to vegetation. Since that time, as technology grew, various industries added more air pollutants to the air. e.g. the metallurgical industry and the chemical industry contributed more air pollutants such as sulfur dioxide, fluoride, oxide of nitrogen and others. In recent decades , automobile exhaust has become another problem of air pollution. Petroleum components in the exhaust react with atmospheric components in the presence of sunlight to form photochemical oxidants, e.g. Ozone. All of these air pollutants did cause economic damage to vegetation.

Air pollution damage to vegetation can often show a typical or characteristic symptoms on the plant leaves. This can be utilized as a good way for the assessment of air pollution damage to vegetation. This assessment method for the identification of air pollutants injury to temperate crops has been well studied by the developed countries, e.g. U.S.A., Japan and the European countries. However, it seems that there is still a shortage of research work on the subtropical and tropical crops. Therefore, our purpose here is to bring together for the first time in one place information on using plants of the temperate, subtropical and tropical types to biomonitor air pollutants.

All of the photos of the developed symptoms of the air pollution injury to vegetation were the research works of the lab. of environmental protection of agriculture, department of agricultural chemistry, Taiwan Agricultural Research Institute. All of this research works have been done in a controlled fumigation condition for the past few years collectively.

This information should be of interest to scientists, government officials, industrialists, environmentalists and others concerned with the air quality.

A. 二氧化硫 · Sulfur Dioxide.

A-1 水稻. Rice. Oryza sativa L.

SO_2 1.4ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：水稻幼苗呈現葉尖乾枯，攝影：處理後6天，使用品種：台農67號．

SO_2 1.4ppm, fumigation period: 24 hrs. (day/night), fumigation condition: temp. 25／20℃ (day/night), humidity 80％, light 7000 lux, symptom: tip necrosis at seedling stage, photo: 6 days after fumigation, cultivar used is written in the Chinese section.

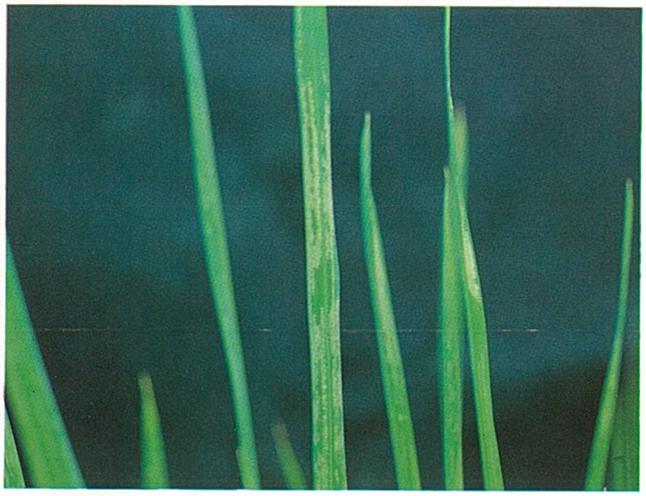
A-2 水稻. Rice.

照片 A-1 的近照.(葉尖乾枯).

A close view of plate A-1. (tip necrosis).

A-3 水稻. Rice.

SO_2 2.2ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉間水漬狀，攝影：處理後1小時，使用品種：台農67號.



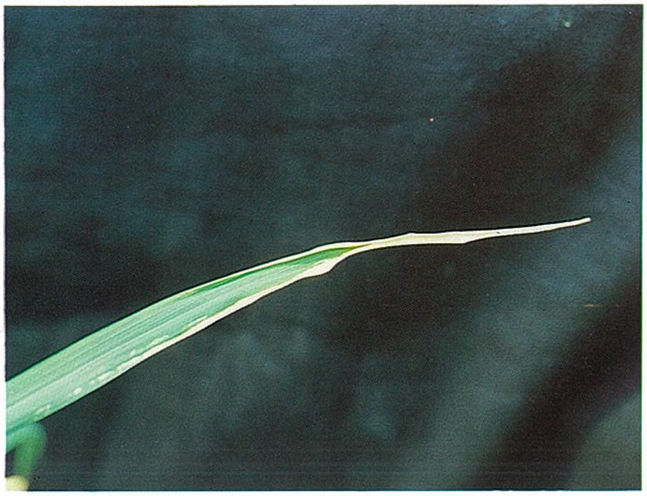
SO_2 2.2ppm, fumigation period: 24 hrs. (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: watersoaked appearance at Vigorous growing stage,photo: 1 hr. after fumigation, cultivar used is written in the Chinese section.

A-4 水稻. Rice.

SO_2 2.2ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉脈間條紋斑(生長盛期)，攝影：處理後2天，使用品種：台農67號.

SO_2 2.2ppm, fumigation period: 24 hrs. (day/night), fumigation condition: temp. 25／20℃ (day/night), humidity 80％, light 7000 lux, symptom: necrotic streaks between the veins at vigorous growing stage, photo: 2 days after fumigation, cultivar used is written in the Chinese section.

A-5 水稻. Rice.



SO_2 1.5ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉尖乾枯(生長盛期)，攝影：處理後9天，使用品種：台中秈10號.

SO_2 1.5ppm, fumigation period: 24 hrs. (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: tip necrosis, can also be observed at vigorous growing stage, photo: 9 days after fumigation, cultivar used is written in the Chinese section.

A-6 甘藷. Sweet Potato. Ipomoea batatas (L.).

SO_2 2.2ppm，處理時間：26小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉間水漬狀，攝影：處理後立即拍照，使用品種：台農品系.

SO_2 2.2ppm, fumigation period: 26 hrs. (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: watersoaked appearance, photo: immediately after fumigation, cultivar used is written in the Chinese section.

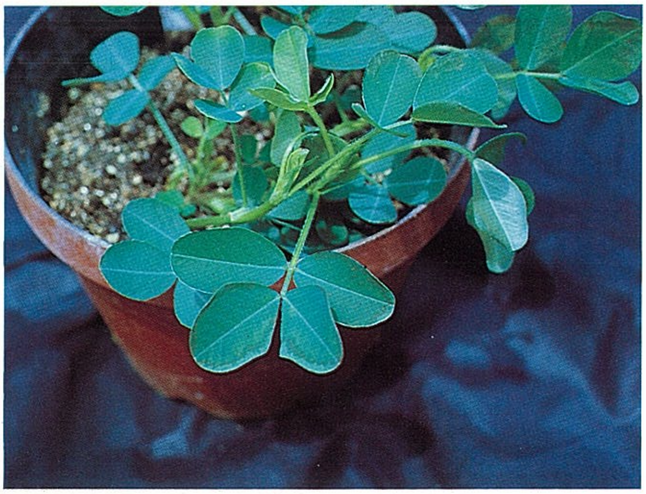
二氧化硫

A-7　甘藷.　Sweet Potato.

SO_2 2.2ppm，處理時間：26小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉脈間乾枯，攝影：處理後1天，使用品種：台農品系.

SO_2 2.2ppm, fumigation period: 26 hrs. (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: interveinal necrosis ,photo: 1 day after fumigation, cultivar used is written in the Chinese section.

A-8　花生.　Peanut. Arachis hypogaea L.

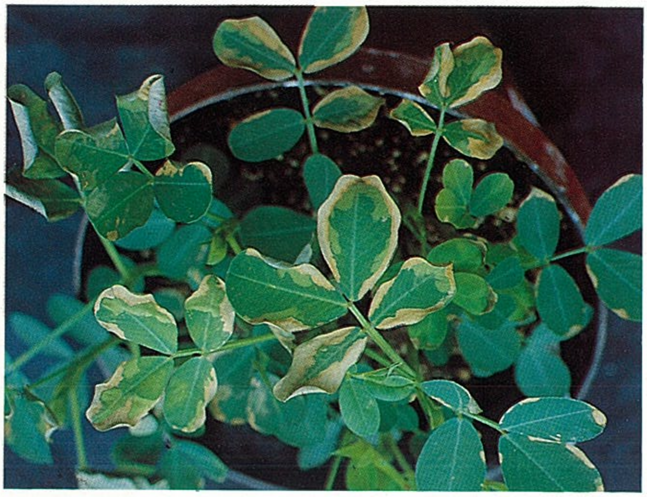


SO_2 2.7ppm，處理時間：20小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉間水漬狀，攝影：處理後1小時，使用品種：台南品系.

SO_2 2.7ppm, fumigation period: 20 hrs. (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: watersoaked appearance at older stage, photo: 1 hour after fumigation, cultivar used is written in the Chinese section.

A-9 花生． Peanut.

SO_2 2.7ppm，處理時間：20小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉緣乾枯，攝影：處理後1天，使用品種：台南品系.



SO_2 2.7ppm, fumigation period: 20 hrs. (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: marginal necrosis, photo: 1 day after fumigation, cultivar used is written in the Chinese section.

A-10 大豆． Soybean. Glycine max(L.) Merrill.

SO_2 2.1ppm，處理時間：40小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉間水漬狀，攝影：處理後立即拍照，使用品種：台農品系.

SO_2 2.1ppm, fumigation period: 40 hrs. (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: watersoaked appearance at older stage, photo: immediately after fumigation, cultivar used is written in the Chinese section.

A-11 大豆. Soybean.

SO_2 2.1ppm，處理時間：40小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：如照片所示的葉間乾枯，攝影：處理後1天，使用品種：台農品系.

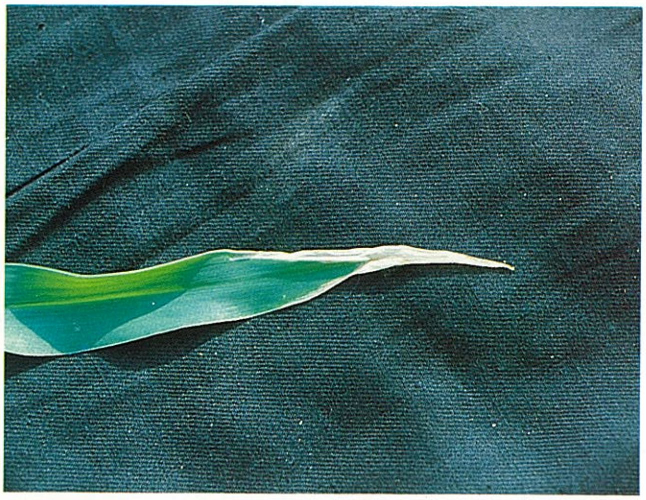
SO_2 2.1ppm, fumigation period: 40 hrs. (day/night), fumigation condition: temp. 25／20℃ (day/night), humidity 80％, light 7000 lux, symptom: necrosis as shown in the plate, photo: 1 day after fumigation, cultivar used is written in the Chinese section.

A-12 玉米. Corn. Zea mays Linn.

SO_2 3.5ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉間水漬狀，攝影：處理後2天，使用品種：台農品系.

SO_2 3.5ppm, fumigation period: 24 hrs. (day/night), fumigation condition: temp. 25／20℃ (day/night), humidity 80％, light 7000 lux, symptom: watersoaked appearance, photo: 2 days after fumigation, cultivar used is written in the Chinese section.

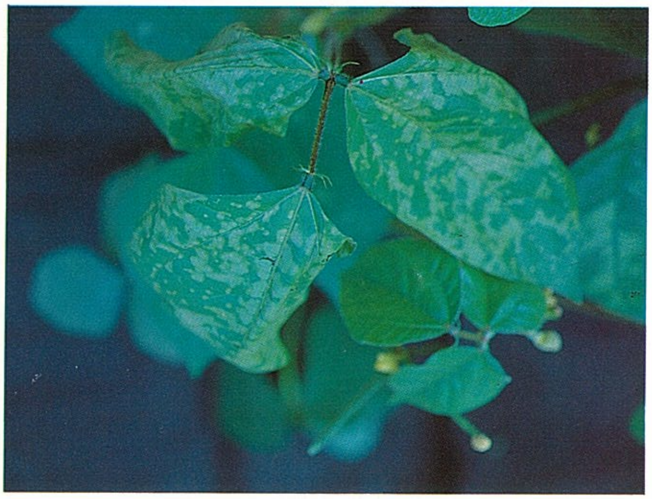
A-13 玉米. Corn.



SO_2 1.2ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉尖乾枯，攝影：處理後8天，使用品種：台農品系.

SO_2 1.2ppm, fumigation period: 24 hrs. (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: tip necrosis, photo: 8 days after fumigation, cultivar used is written in the Chinese section.

A-14 綠豆. Mungbean. Vigna radiata (L) Wilczek.

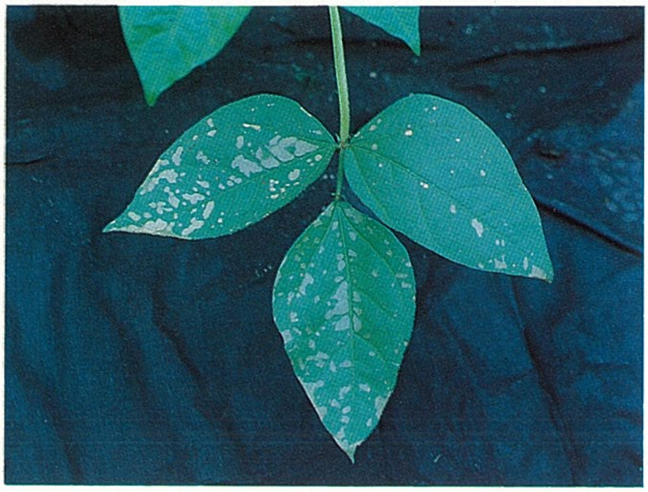


SO_2 4.0ppm，處理時間：20小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉間水漬狀，攝影：處理後1小時，使用品種：台南品系.

SO_2 4.0ppm, fumigation period: 20 hrs. (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: watersoaked appearance, photo: 1 hr. after fumigation, cultivar used is written in the Chinese section.

A-15 綠豆. Mungbean.

SO_2 2.7ppm，處理時間：20小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉間水漬狀，攝影：處理後24小時，使用品種：台南品系.



SO_2 2.7ppm, fumigation period: 20 hrs. (day/night), fumigation condition: temp. 25／20℃ (day/night), humidity 80％, light 7000 lux, symptom: watersoaked appearance, photo: 24 hrs. after fumigation, cultivar used is written in the Chinese section.

A-16 綠豆. Mungbean.

SO_2 3.0ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：如照片所示的葉間乾枯，攝影：處理後4天，使用品種：台南品系.

SO_2 3.0ppm, fumigation period: 24 hrs. (day/night), fumigation condition: temp. 25／20℃ (day/night), humidity 80％, light 7000 lux, symptom: necrosis as shown in the plate, photo: 4 days after fumigation, cultivar used is written in the Chinese section.

A-17 甘蔗. Sugarcane. Saccharum officinarum L.

SO_2 3.2ppm，處理時間：40小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉脈間條紋斑，攝影：處理後3天，使用品種：台糖品系.

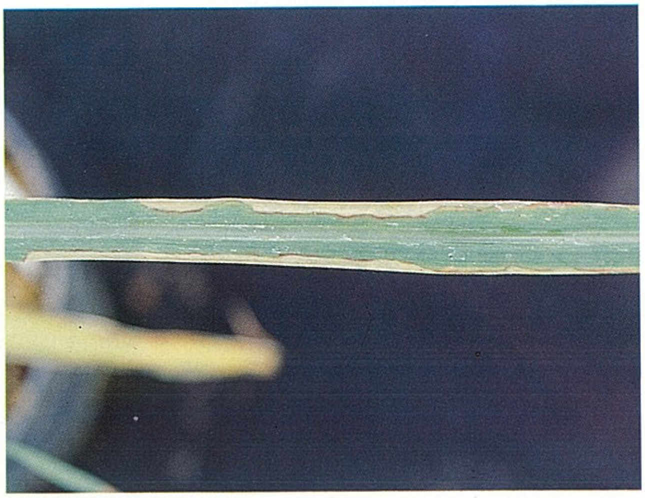
SO_2 3.2ppm, fumigation period: 40 hrs. (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: interveinal streaks, photo: 3 days after fumigation, cultivar used is written in the Chinese section.

A-18 甘蔗. Sugarcane.

SO_2 3.2ppm，處理時間：40小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉尖乾枯，攝影：處理後3天，使用品種：台糖品系.

SO_2 3.2ppm, fumigation period: 40 hrs. (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: tip necrosis, photo: 3 days after fumigation, cultivar used is written in the Chinese section.

A-19 甘蔗. Sugarcane.



SO_2 4.4ppm，處理時間：5天(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉緣乾枯，攝影：處理後1天，使用品種：台糖品系.

SO_2 4.4ppm, fumigation period: 5 days. (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: marginal necrosis photo: 1 day, after fumigation, cultivar used is written in the Chinese section.

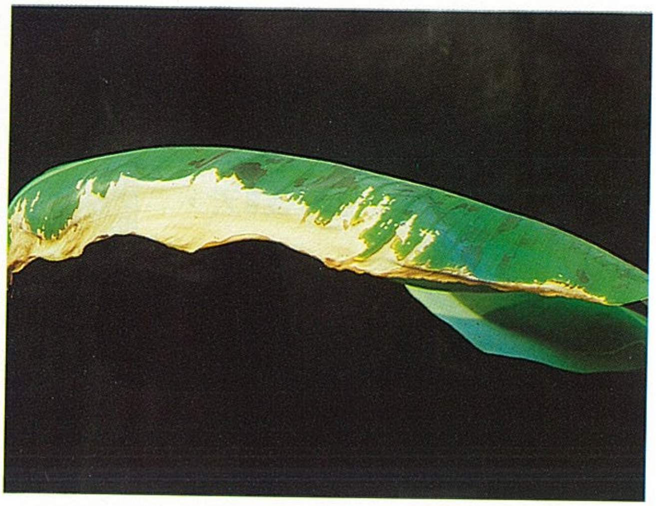
A-20 香蕉. Banana. Musa spp.

SO_2 2.2ppm，處理時間：26小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉間水漬狀，攝影：處理後1天，使用品種：台糖品系.

SO_2 2.2ppm, fumigation period: 26 hrs. (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: watersoaked appearance, photo: 1 day after fumigation, cultivar used is written in the Chinese section.

A-21 香蕉. Banana.

SO_2 4.4ppm，處理時間：3天(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉緣乾枯，攝影：處理後8.5天，使用品種：北蕉.



SO_2 4.4ppm, fumigation period: 3 days (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: marginal necrosis, photo: 8.5 days after fumigation, cultivar used is written in the Chinese section.

A-22 香蕉. Banana.

SO_2 4.4ppm，處理時間：3天(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉尖乾枯及葉緣乾枯，攝影：處理後3.5天，使用品種：北蕉.

SO_2 4.4ppm, fumigation period: 3 days (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: marginal necrosis and tip necrosis, photo: 3.5 days after fumigation, cultivar used is written in the Chinese section.

A-23 鳳梨. Pineapple. Ananas comosus Merr.

SO_2 6.2ppm，處理時間：1天(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：如照片所示的葉間乾枯，攝影：處理後8天，使用品種：開英.

SO_2 6.2ppm, fumigation period: 1 days (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: necrosis as shown in the plate, photo: 8 days after fumigation, cultivar used is written in the Chinese section.

A-24 龍眼. Longan. Euphoria longana Lam.

SO_2 7.6ppm，處理時間：2天(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉緣乾枯，攝影：處理後12天，使用品種：粉殼.

SO_2 7.6ppm, fumigation period: 2 days (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: marginal necrosis, photo: 12 days after fumigation, cultivar used is written in the Chinese section.

A-25 蕃石榴. Guava. Psidium guajava L.

SO_2 2.5ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉間水漬狀，攝影：處理後1天，使用品種：梨拔.

SO_2 2.5ppm, fumigation period: 24 hrs.(day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: watersoaked appearance, photo: 1 day after fumigation, cultivar used is written in the Chinese section.

A-26 蕃石榴. Guava.

SO_2 2.2ppm，處理時間：23小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉脈間乾枯，攝影：處理後6天，使用品種：中山月拔.

SO_2 2.2ppm, fumigation period: 23 hrs. (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: interveinal necrosis, photo: 6 days after fumigation, cultivar used is written in the Chinese section.

A-27 橄欖. Kanran (Chinese olive). Canarium album Raeusch.

SO_2 9.7ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80%，光度7000lux，徵狀：葉間水漬狀，攝影：立即拍照 ，使用品種：台灣本地種.

SO_2 9.7ppm, fumigation period: 24 hrs.(day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80%, light 7000 lux, symptom: watersoaked appearance, photo: immediately after fumigation, cultivar used is written in the Chinese section.

A-28 橄欖. Kanran (Chinese olive).

SO_2 9.7ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80%，光度7000lux，徵狀：葉間水漬狀，攝影：處理後1天，使用品種：台灣本地種.

SO_2 9.7ppm, fumigation period: 24 hrs.(day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80%, light 7000 lux, symptom: watersoaked appearance, photo: 1 day after fumigation, cultivar used is written in the Chinese section.

A-29 橄欖. Kanran (Chinese olive).

SO_2 9.7ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：黃化及落葉，攝影：處理後6天，使用品種：台灣本地種.

SO_2 9.7ppm, fumigation period: 24 hrs.(day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: chlorosis & the defoliation, photo: 6 days after fumigation, cultivar used is written in the Chinese section.

A-30 橄欖. Kanran (Chinese olive).

照片 A-29 的近照.(落葉近照).

A close view of plate A-29. (fallen leaves).

A-31 咖啡. Coffee. Coffea spp.

SO_2 8.2ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉間水漬狀，攝影：處理後1天，使用品種：適合台灣栽培品系.

SO_2 8.2ppm, fumigation period: 24 hrs.(day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: watersoaked appearance, photo: 1 day after fumigation, cultivar used is written in the Chinese section.

A-32 咖啡.Coffee.

SO_2 9.8ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：如照片所示的葉間乾枯，攝影：處理後4天，使用品種：適合台灣栽培品系.

SO_2 9.8ppm, fumigation period: 24 hrs.(day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: necrosis as shown in the plate, photo: 4 days after fumigation, cultivar used is written in the Chinese section.

A-33 柑桔. Citrus fruit. citrus spp.

SO_2 9.8ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：如照片所示的葉間乾枯，攝影：處理後4天，使用品種：柳丁.

SO_2 9.8ppm, fumigation period: 24 hrs.(day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: necrosis as shown in the plate, photo: 4 days after fumigation, cultivar used is written in the Chinese section.

A-34 蓮霧. Wax apple. Syzygium samarangense Merr.et Perry.

SO_2 9.2ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉脈間乾枯，攝影：處理後2天，使用品種：黑珍珠.

SO_2 9.2ppm, fumigation period: 24 hrs. (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: interveinal necrosis, photo: 2 days after fumigation, cultivar used is written in the Chinese section.

A-35 芒果. Mango. Mangifera indica L.

SO_2 4.4ppm，處理時間：2天(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉間水漬狀，攝影：處理後17小時，使用品種：海頓.

SO_2 4.4ppm, fumigation period: 2 days(day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: watersoaked appearance, photo: 17 hrs. after fumigation, cultivar used is written in the Chinese section.

A-36 芒果. Mango.

SO_2 4.4ppm，處理時間：2天(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉脈間乾枯，攝影：處理後3天，使用品種：海頓.

SO_2 4.4ppm, fumigation period: 2 days. (day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: interveinal necrosis, photo: 3 days after fumigation, cultivar used is written in the Chinese section.

A-37 芒果. Mango.

SO_2 4.4ppm，處理時間：2天(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：如照片所示的葉間乾枯，攝影：處理後3天，使用品種：愛文.

SO_2 4.4ppm, fumigation period: 2 days.(day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: necrosis as shown in the plate, photo: 3 days after fumigation, cultivar used is written in the Chinese section.

A-38 木瓜. Papaya. Carica papaya Linn.

SO_2 1.85ppm，處理時間：22小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉間水漬狀，攝影：立即拍照，使用品種：日陞.

SO_2 1.85ppm, fumigation period: 22 hrs.(day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: watersoaked appearance, photo: immediately after fumigation, cultivar used is written in the Chinese section.

A-39 木瓜. Papaya.

SO_2 1.85ppm，處理時間：22小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉脈間乾枯，攝影：處理後2天，使用品種：日陞.

SO_2 1.85ppm, fumigation period: 22 hrs.(day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: interveinal necrosis, photo: 2 days after fumigation, cultivar used is written in the Chinese section.

A-40 可可椰子. Coconut. Cocos nucifera L.

SO_2 8.2ppm，處理時間：3天(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉間水漬狀，攝影：處理後1天，使用品種：矮幹早熟種.

SO_2 8.2ppm, fumigation period: 3 days(day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: watersoaked appearance, photo: 1 day after fumigation, cultivar used is written in the Chinese section.

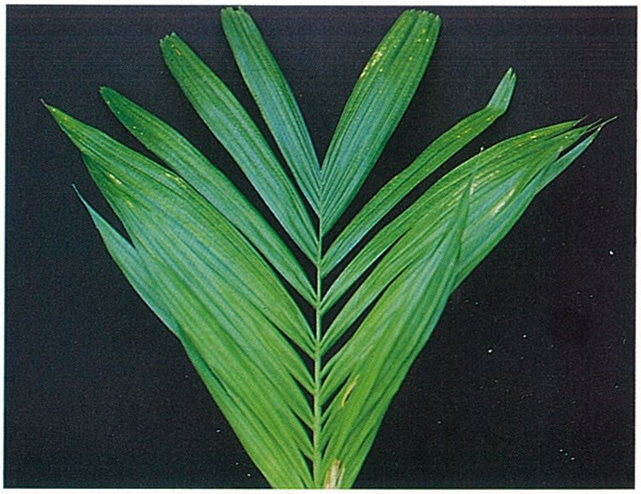
A-41 可可椰子. Coconut.

SO_2 8.2ppm，處理時間：3天(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：如照片所示的葉間乾枯，攝影：處理後3天，使用品種：矮幹早熟種.

SO_2 8.2ppm, fumigation period: 3 days(day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: necrosis as shown in the plate, photo: 3 days after fumigation, cultivar used is written in the Chinese section.

A-42 檳榔. Betel palm. Areca cathecu L.

SO_2 9.2ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：如照片所示，攝影：處理後4天，使用品種：短仔.



SO_2 9.2ppm, fumigation period: 24 hrs.(day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom:as shown in the plafe, photo: 4 days after fumigation, cultivar used is written in the Chinese section.

A-43　楊桃．Carambola. Averrhoa carambola, L.

SO_2 2.7ppm，處理時間：24小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：如照片所示，攝影：處理後2天，使用品種：二林.

SO_2 2.7ppm, fumigation period: 24 hrs.(day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom:as shown in the plate, photo: 2 days after fumigation, cultivar used is written in the Chinese section.

A-44　楊桃．Carambola.

照片 A-43 的近照.

A close view of plate A-43.

A-45 酪梨. Avocado. Persea americana Mill.

SO_2 4.95ppm，處理時間：25小時(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：如照片所示的葉間乾枯，攝影：處理後3天，使用品種：西印度.

SO_2 4.95ppm, fumigation period: 25 hrs.(day/night), fumigation condition: temp. 25／20℃ (day/night), humidity 80％, light 7000 lux, symptom: necrosis as shown in the plate, photo: 3 days after fumigation, cultivar used is written in the Chinese section.

A-46 酪梨 .Avocado.

照片 A-45 的近照.

A close view of plate A-45.

A-47 酪梨. Avocado.

照片 A-45 的近照.

A close view of plate A-45.

A-48 波羅蜜. Jack fruit. Artocarpus heterophyllus Lam.

SO_2 2.5ppm，處理時間：2 天(日／夜)，處理時條件：溫度25／20℃(日／夜)，溼度80％，光度7000lux，徵狀：葉間水漬狀，攝影：處理後6小時，使用品種：適合台灣栽培品系.

SO_2 2.5ppm, fumigation period: 2 days(day/night), fumigation condition: temp. 25／20℃(day/night), humidity 80％, light 7000 lux, symptom: watersoaked appearance, photo: 6 hrs. after fumigation, cultivar used is written in the Chinese section.